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STUDY OF CONSUMER ACCEPTANCE ABOUT THE POTENTIAL INTRODUCTION IN THE MARKET OF A CHEESE WITH BERRIES

Running Title: CONSUMER SURVEY ABOUT A NEW CHEESE PRODUCT

Ana Cristina Ferrão[1*], Raquel P. F. Guiné[1,2], Paula M. R. Correia[1]

[1]*CI&DETS Research Centre and Department of Food Industry, Polytechnic Institute of Viseu, Portugal.*
[2]*CITAB, University of Trás-os-Montes, Vila Real, Portugal.*

[*]**Corresponding author:**
Ana Cristina Ferrão
Escola Superior Agrária de Viseu, Quinta da Alagoa, Estrada de Nelas, Ranhados, 3500-606 Viseu, Portugal.
Tel: + 351 232 446 600; Fax: +351 232 426 536
E-mail: acristinaferrao@gmail.com

Abstract

BACKGROUND: Nowadays, consumers are more concerned about the issues related to the maintenance and promotion of health, trying to combine the pleasure in the consumption of certain foods with health benefits. Therefore, there has been an increasing in the market of functional foods.

OBJECTIVE: The present study was carried out in order to explore the consumers' acceptance regarding the possibility of introducing in the market a new dairy product with functional properties, namely a cheese with berries.

METHODS: A descriptive cross-sectional study was undertaken on a non-probabilistic sample of 335 adult participants. The questionnaires were applied online after informed consent only to adults (aged 18 or over) and the data were collected from August 2016 to March 2017 among the Portuguese population.

RESULTS: The results obtained showed that approximately 92% of the participants consumed cheese of any type regularly and 50% consumed cheese two or three times per week. Most of the participants (~62%) revealed that they did not consume any type of cheese with additional benefits.

Nevertheless, they indicated that they might be potential consumers of a cheese with berries (~73%) and would like the product to have the ability to improve cardiovascular health (~73%) and have high antioxidant capacity (~51%). Participants recognized as very important the addition of ingredients such as blackberry, raspberry, gooseberry, blueberry, strawberry or cherry, and manifested that all of the ingredients suggested might combine well with cheese.
CONCLUSION: This work showed that the introduction in the market of this new dairy product, a cheese with berries, might be a successful strategy.

Keywords: Acceptance, cheese, consumers, functional foods, health benefits, market study, new product development, survey

1. INTRODUCTION

Cheese is a fermented dairy product, traditionally present in the Mediterranean diet, and it is characterized by being easily digestible and normally well tolerated [1,2]. It is a rich source of dietary calcium, since approximately 35 g of hard cheese can provide 250 mg of calcium [3]. In normal dietary conditions, the bioavailability of calcium is higher in milk and dairy products than in other foods, such as vegetables and cereals [4–6]. Furthermore, cheese can also be a good alternative to milk for those who are lactose intolerant [2,3]. However, some cheeses have a high content of saturated fatty acids that could contribute to elevated low-density lipoprotein cholesterol, a well-defined risk factor for cardiovascular diseases [7]. For that reason, dietary guidelines recommend the consumption of low-fat dairy products, avoiding high-fat ones [8].

Nowadays, foods are not only intended to provide basic nutrients but also to improve physical and mental well-being of humans and prevent nutrition-related diseases [9,10]. In the last decades, it has been reported the rising awareness and interest of consumers for health and functional foods, such as low-fat, low-sugar, high-antioxidant or high-fibre. Considering the increasing market of functional foods, gaining more insight on consumers' preferences for a wide range of heath-enhancing dairy products may benefit not only consumers, but also manufacturers [11–13]. Berries, such as blackberry, raspberry, gooseberry, blueberry and strawberry, are widely known for their antioxidant properties, among others [14–16].

In an increasingly competitive food market, the developing of a new food product can be very challenging for the food manufacturers, as they need to ensure that those products and ideas meet the expectations of the consumers [17–19]. Therefore, marketing communication strategies that inform consumers about product benefits plays a major role in order to encourage consumers to adopt

product innovations [20,21]. However, before the development of a new food product there are some considerations that are need to be addressed, such as, consumers needs and marketing and technological opportunities [22–24]. According to Lancaster's theory, consumers make choices based on their preferences for attributes of goods. Hence, choices are determined by particular combinations of product attributes [25,26]. Consumer surveys and market research are key factors in the success of a new food product, since they make it possible to see, in time for corrective action, the positive and less positive aspects valued by potential consumers [27,28].

The aim of the present work was to investigate the consumer's acceptance towards the possibility of introducing in the market a new dairy product with added functional foods, namely a cheese with berries.

2. MATERIALS AND METHODS

2.1. Instrument

For this study a questionnaire was purposely created to undertake a market study to investigate the potential for marketing a new type of dairy product as well as to evaluate consumer acceptance.

The questionnaire included several sections, destined to collect information about several important issues:

Part I – Sociodemographic data (1. Age, 2. Gender, 3. Highest Level of Education achieved, 4. Civil State, 5. Profession);

Part II – Eating habits related to cheese (6. Do you eat cheese (any type) regularly, 7. Do you eat fresh cheese regularly, 8. What is the preference regarding the cheese origin, 9. What is the preference regarding the milk origin for cheese, 10. What is the preference regarding the purchase of cured cheese, 11. What is the preference regarding the purchase of fresh cheese, 12. What is the preference regarding the cheese consistency, 13. What are the types of chess consumed regularly, 14. What is the frequency of consumption of cheese, 15. What is the amount of cheese consumed daily, 16. Do you usually consume chesses with additional health benefits);

Part III – Acceptance of the new product (17. Are you aware of the health benefits associated with the consumption red berries, 18. Would be a potential consumer of cheese with red berries, 19. What attributes for health enhancing would you like to find in a cheese with red berries, 20. What reasons could contribute to make you consume cheese with red berries);

Part IV – Attitudes towards new ingredients for cheese (21 to 26 a). Classify the importance of the health effects attributed to the following red fruits: Blackberry, Cherry, Raspberry, Currant, Blueberry, Strawberry; b) Do you think these ingredients may combine with fresh cheese).

All questions were built with prefixed answers, except for age, for which the respondents would indicate their age in years.

2.2. Data collection

It was undertaken a descriptive cross-sectional study on a non-probabilistic sample of 335 participants. The dimension of the sample was intended to be over 300 people who consumed cheese, as specified by the company promoting the development of this new food product. The data were collected from August 2016 to March 2017 among the Portuguese population. The questionnaires were applied online after informed consent only to adults (aged 18 or over). All ethical issues were verified when formulating and applying the questionnaire.

2.3. Statistical analysis

Several basic descriptive statistical tools were used for exploratory analysis of the data. In order to assess the relations between some of the categorical variables under study, were used the crosstabs and the chi square test. In all tests the level of significance considered was 5%.

To evaluate the strength of the significant relations found between some of the variables at study, Cramer's V coefficient was used. This coefficient varies from 0 to 1, and for $V \approx 0.1$ the association is considered weak, for $V \approx 0.3$ the association is moderate and for $V \approx 0.5$ or over, the association is strong [29].

For all data analyses it was used the SPSS software from IBM Inc. (version 24).

3. RESULTS AND DISCUSSION

3.1. Sample characterization

Table 1 summarizes the demographical data for the sample studied. This work involved 335 participants aged a minimum of 18 years and maximum of 71 years, being on average 36 ± 14 years, from which 57.3% were women and 42.7% were men. The average age of men, 36 ± 15 years, was similar to that of women, 36 ± 13 years. As for age, the participants were classified into categories according to: young adults ($18 \leq \text{age} \leq 30$), corresponding to 46.3%; average adults ($31 \leq \text{age} \leq 50$), accounting for 36.4%; senior adults ($51 \leq \text{age} \leq 64$), representing 15.2%; and finally elderly (≥ 65), which accounted for 2.1% of the sample.

Regarding the level of education, 59.4% of the participants had a university degree, while 40.6% had completed secondary school, and none had the lowest level of education (primary school) as their terminal education.

Concerning the civil state, 46.6% of the participants were single, 42.7% were married or lived together as a marital couple, 9.0% were separated or legally divorced and 1.8% were widow.

As for the profession, most of the participants were employed 61.8%, 34.3% were students, 2.4% were unemployed, and only 1.5% were retired.

Table 1. Sociodemographical characterization.

Sociodamographical data		Frequency (N)	Percentage (%)
Age	$18 \leq age \leq 30$	155	46.3
	$31 \leq age \leq 50$	122	36.4
	$51 \leq age \leq 64$	51	15.2
	≥ 65	7	2.1
Gender	Female	192	57.3
	Male	143	42.7
Highest Level of Education	Primary School	0	0.0
	Secondary School	136	59.4
	University degree	199	40.6
Civil state	Single	156	46.6
	Married/Living together	143	42.7
	Divorced/Separated	30	9.0
	Widow	6	1.8
Profession	Student	115	34.3
	Employed	207	61.8
	Unemployed	8	2.4
	Retired	5	1.5
Total number of participants		**335**	**100.0**

3.2. Consumption habits about cheese

According to the information of International Dairy Federation and Statistics Canada, in 2015 the consumption of cheese in the European Union was 18.3 Kg *per capita* [30]. Various factors, such as socioeconomic status, demographics, taste, convenience, food cost, lifestyle characteristics, security, cultural and religious beliefs or nutrition knowledge, influence not only food choices but also food intake [31,32]. Thus, being the main purpose of this survey the consumer acceptance of a new cheese product, the habits of the participants regarding the consumption of cheese were investigated.

The results obtained showed that most of the participants (92.2%) consumed cheese regularly, of any type, being this percentage higher for men (95.8%) when compared to women (89.4%). According to age groups, it was verified that senior adults were the ones who consumed more cheese regularly (98.0%), followed by young adults (91.6%), average adults (90.9%) and finally the elderlies, with a percentage of 85.7%. It was also analysed, specifically, the frequency of consumption of fresh cheese. In this case, there was a slightly lower percentage of participants consuming fresh cheese regularly (85.6%), with the percentage for men being again a little higher than for women (93.0% and 80.1%, respectively). As for the age group, the regularity of the consumption of fresh cheese was higher for the elderly group (100.0%), followed by the young adults (89.0%), senior adults (86.3%) and average adults (80.2%).

Figure 1 shows the participants' preferences regarding cheese origin, and it was observed that the majority of the participants did not have a preference for national or foreign cheese (70.6%), while 28.8% preferred national cheese and only a few preferred specifically foreign cheese (0.6%). Both women and men showed similar indifferentiation for national or foreign cheese (59.5% and 85.7%, respectively), 40.0% of the women preferred national cheese against 13.6% of men, and again only a small percentage of women or men preferred specifically foreign cheeses. These trends were not much different between participants with a university degree and secondary school, with the option of equally liking foreign or national cheeses, being the most favoured (63.3% and 81.3%, respectively).

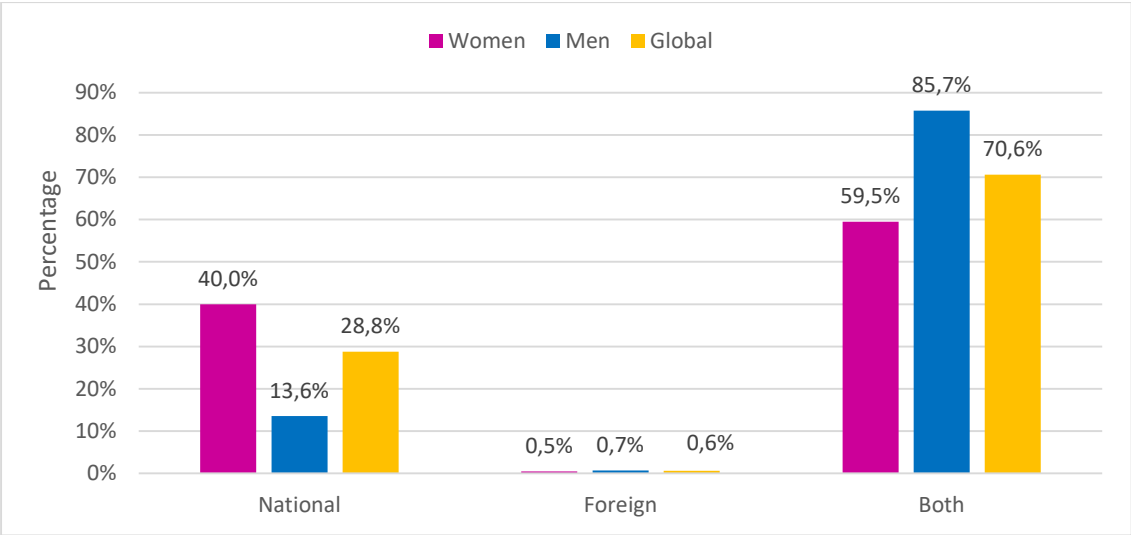

Figure 1. Preference of cheese regarding the origin, according to gender.

As to the possible association between the variables Cheese Origin *versus* Gender and *versus* Education Level, it was found that there were significant associations between the variables, and

therefore gender (Chi square test: χ^2= 27.465; p = 0.000) and education level (Chi square test: χ^2= 13.030; p = 0.001) influenced the preference for cheese origin. The values of Cramer's coefficient, indicated that the association was weak for gender (V=0.288) and also weak for education level (V=0.199).

It is well established the relationship between milk quality and cheese quality [33]. The milk of different animal species has variable composition, particularly in fat and protein, thus inducing differences also in the dairy products made with them [34,35]. Therefore, it was evaluated the participants' preference of cheese according to the milk origin. Table 2 presents the participants' preferences regarding the milk origin, and the results showed that cheese made with sheep milk was the most appreciated by the participants (63.6%), being that type of cheese more appreciated by women (66.7%) than by men (59.4%). This finding is contrary to that of Vargas-Bello-Pérez et al. [36], according to which in Chile the most preferred type of cheese was from cow's milk. For men, the preferred type of cheese was the mixture one, corresponding to 68.5% of the male participants. In the last years, sheep dairy products have gained market size due to the product's quality, high yield, and nutritional value [37,38]. Sheep milk is an excellent matrix for cheese production, because of its high levels of protein, fat and calcium by casein unit [39,40].

Table 2. Preference of cheese regarding the milk origin.

Milk origin	Global		Women		Men		Chi square test		Cramer's coefficient
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	χ^2	p	V
Cow	47.5	52.5	51.0	49.0	42.7	57.3	2.311	0.129	0.083
Sheep	63.6	36.4	66.7	33.3	59.4	40.6	1.848	0.174	0.074
Mixture	49.3	50.7	34.9	65.1	68.5	31.5	37.098	0.000	0.333
Goat	47.8	52.2	41.7	58.3	55.9	44.1	6.696	0.010	0.141
Other	0.6	99.4	1.0	99.0	0.0	100	---	---	---

The results of the Chi square test showed that gender only influenced the preference for mixture and goat cheese (χ^2= 37.098; p = 0.000 and χ^2= 6.696; p = 0.010, respectively). As for Cramer's coefficients, the values indicated that the association between the variable Preference of cheese regarding the milk origin *versus* Gender, was moderate for mixture cheese (V=0.333) and weak for goat cheese (V=0.141).

Purchasing intention is affected by how consumers perceive that the product, through its usage, can satisfy their needs [25]. In this way, one of the questions aimed at knowing the effect of the

cheese presentation on the buying preferences, due to the convenience associated with this variable. Table 3 shows the cured cheese purchase preference by the participants in this survey. The cheese in quarters was the most preferred (70.1%), either by women (60.7%) or by men (82.5%). Following in preference appeared slices (40.1%), halves (25.1%) and whole (18.9%). Regarding whole cheese purchasing, it was observed that a higher percentage of women preferred purchasing cheese in that form (27.7%) when compared to men (7.0%).

Table 3. Cured cheese purchase preference.

Cheese	Global		Women		Men		Chi square test		Cramer's coefficient
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	χ^2	p	V
Whole	18.9	81.1	27.7	72.3	7.0	93.0	23.019	0.000	0.263
Halves	25.1	74.9	23.6	76.4	27.3	72.7	0.599	0.439	0.042
Quarters	70.1	29.9	60.7	39.3	82.5	17.5	18.501	0.000	0.235
Slices	40.1	59.9	42.4	57.6	37.1	62.9	0.973	0.324	0.054

The results revealed that there was an association between the variables Cured cheese purchase preference *versus* Gender for whole cheese (χ^2= 23.019; p = 0.000) and cheese in quarters (χ^2= 18.501; p = 0.000), and hence, gender influenced the purchase preference of cured cheese in these forms. This association was weak to moderate for whole cheese (V=0.263) and weak for cheese in quarters (V=0.235).

As for the preference of fresh cheese purchase, from the sample at study, 49.2% of the participants preferred purchasing fresh cheese in unitary packages, 29.8% in groups of two or four units and 20.9% preferred to purchase the fresh cheese by weight. According to gender, most of the women (36.4%) favoured purchasing fresh cheese in groups of two or four, but as for men they preferred to purchase fresh cheese by weight (70.9%). Chi square test showed that existed an association between the fresh cheese purchase preference and gender (χ^2= 50.425; p = 0.000), which means that gender influenced the purchase preference of fresh cheese, with a moderate association (V=0.394).

It was also analysed the fresh cheese purchase preference according to civil state, as well as the association between these variables. In this case, most of the participants, regardless of civil state, preferred to purchase fresh cheese by weight. The Chi square test showed that civil sate also influenced fresh cheese purchase preference (χ^2= 31.364; p = 0.000), but with a weak association (V=0.220).

The consistency of cheese affects directly its texture. Texture is an important characteristic used to differentiate many cheese varieties [41–43] and is considered by the consumer to be a determinant of overall quality and preference [44–46]. Figure 2 presents the preference regarding the consistency of cheese, and the results showed that hard cheese was appreciated by 37.8% of the participants, being that form of cheese much more appreciated by men than by women (69.8% and 14.3%, respectively). For female participants, the most appreciated form of cheese was the semi-hard (50.8%) and for both genders, the least appreciated form of cheese was the extra-hard. These findings are consistent with the results obtained in other study, where men also preferred harder and more adhesive textures [47].

These differences between genders were statically significant (χ^2= 111.108; p = 0.000), and gender demonstrated to influence the preference for consistency of cheese, with a strong association (V=0.582).

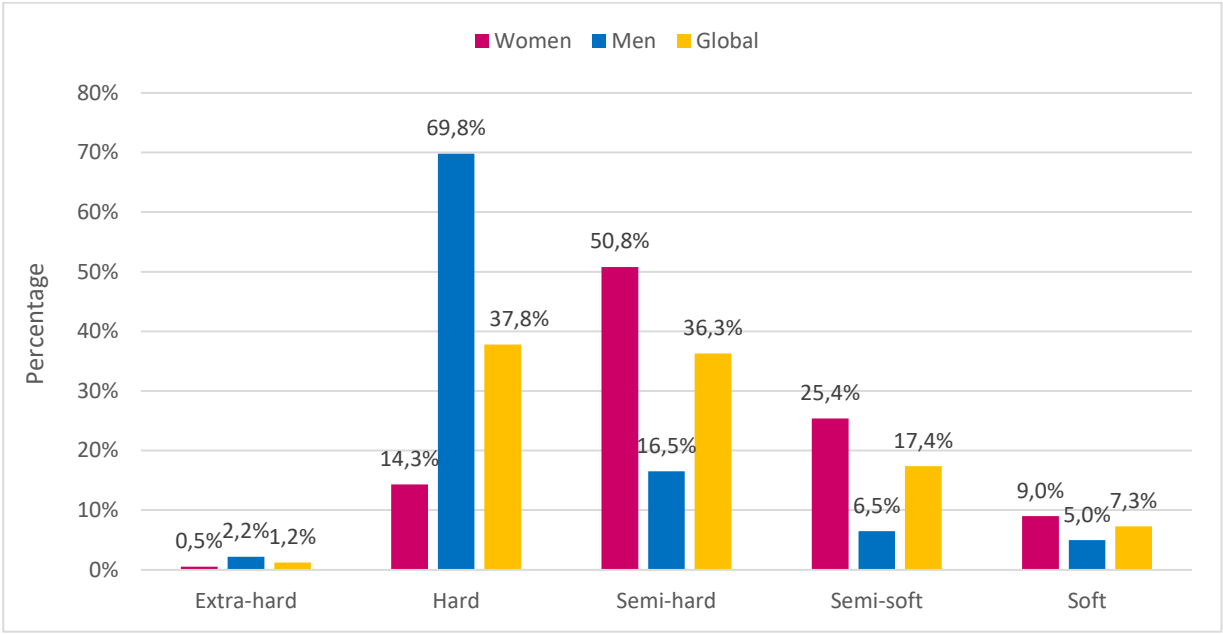

Figure 2. Preference for consistency of cheese, according to gender.

Food preferences and aversions are governed by many psychological and biological factors and despite the fact that there are certain predispositions, mostly of food likes and dislikes are acquired through experience [48,49].

Table 4 shows participants' consumption regarding some types of cheese. Natural fresh cheese and natural cured cheese are the two most consumed types (72.7% and 66.6%, respectively). However, when the types of cheese consumption is analysed by gender, the results showed that women consumed more natural fresh cheese (70.3%) and men more natural cured cheese (83.2%).

Neither women nor men consumed cheese with nuts. The results of the Chi square test made to the association between the variables Types of cheese consumed *versus* Gender, showed that there was a significant association between these two variables for natural cured cheese (χ^2= 31.078; p = 0.000; V=0.305, meaning a moderate association), cheese with aromatic herbs (χ^2= 7.864; p = 0.005; V=0.153, weak association) and cheese with mould (χ^2= 11.034; p = 0.001; V=0.181, weak association).

Table 4. Some types of cheeses consumed by the participants.

Cheese	Global		Women		Men		Chi square test		Cramer's coefficient
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	χ^2	p	V
Natural fresh	72.7	27.5	70.3	29.7	75.5	35.0	1.118	0.290	0.058
Natural cured	66.6	33.4	54.2	45.8	83.2	16.8	31.078	0.000	0.305
Cream cheese	49.9	50.1	52.1	47.9	46.9	53.1	0.897	0.344	0.052
With nuts	---	100	---	---	---	---	---	---	---
With aromatic herbs	7.5	92.5	10.9	89.1	2.8	97.2	7.864	0.005	0.153
With spices	2.7	97.3	3.6	96.4	1.4	98.6	1.1583	0.208	0.069
With mould	7.2	92.8	3.1	96.9	12.6	87.4	11.034	0.001	0.181

The frequency of consumption of cheese is presented in Figure 3, and shows that 50.4% of the participants consumed cheese 2/3 times per week, being the percentages different for women and men (62.5% and 34.3%, respectively). In second place came the daily consumption of cheese, also with an important expression (41.5%) and those who consumed cheese once a week or less represented a minority. Most of the men consumed cheese daily (60.1%), against 27.6% of women. These results indicate that cheese plays an important role in people's diet and therefore this is an important factor for the development of a new cheese product.

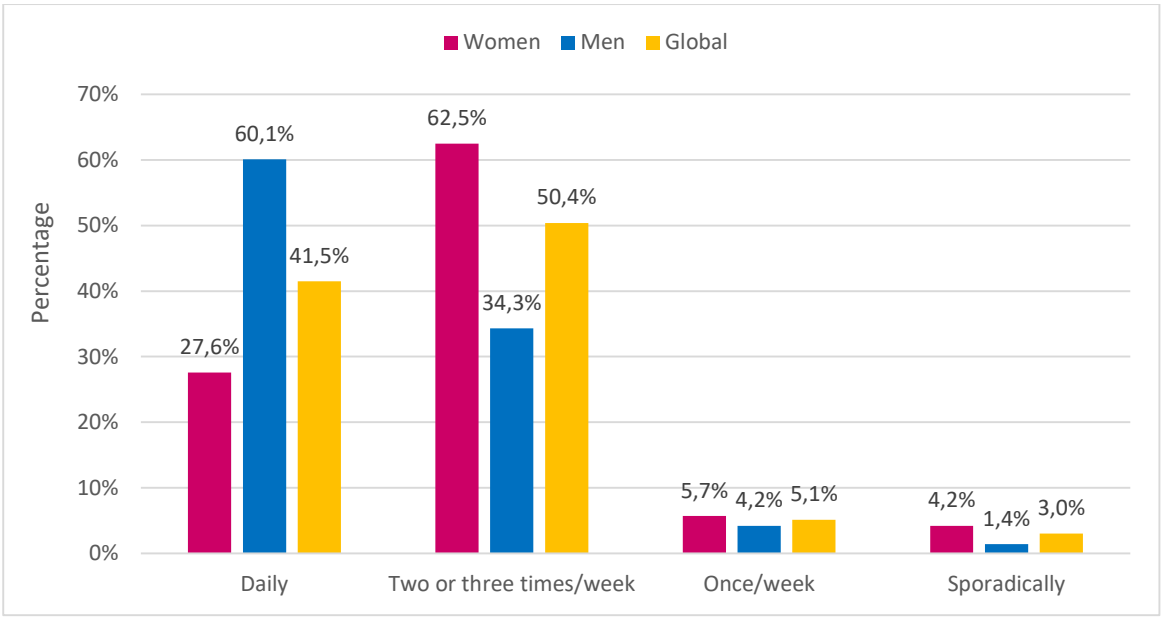

Figure 3. Frequency of consumption of cheese, according to gender.

As to the possible association between the variables Frequency of consumption *versus* Gender, it was found that there was a significant association (χ^2= 36.344; p = 0.000) between these variables, which means that gender influences the frequency of the consumption of cheese. The Cramer´s coefficient was equal to 0.329, meaning that there was a moderate association between these variables.

There were also investigated other possible associations, namely the influence of variables like Civil state and Age group on the frequency of consumption of cheese. The results revealed that both variables influenced the frequency of the consumption of cheese: Age group (χ^2= 19.432; p = 0.022) and Civil state (χ^2= 20.657; p = 0.014). Nevertheless, these associations were weak, given the low values of Cramer's coefficient (V=0.139 for age and V=0.143 for civil state).

Recommendations for dairy intake vary from region to region, but most countries have quantitative recommendations that usually range from 2 to 3 servings or cups of milk or yogurt or sometimes the equivalent serving of cheese [50]. When asked about the daily consumption of cheese, most of the participants (55.2%) indicated that they consumed a slice per day (corresponding to 30 g/day), followed by the daily consumption of two slices (27.9%), three slices or more (11.4%) and half-slice or less (5.4%). However, when women were compared to men, the results were quite different, since 66.9% consumed a slice per day against only 39.6% of the men. Most of the male participants revealed that they consumed two slices per day (40.3%). The consumptions of two slices per day or three or more slices per day were also quite different between men and women, being these percentages higher for men than women. According to the age group and civil state, most of

the participants also consumed a slice of cheese per day. As for the civil state, the exception was the single participants, being that 42.3% of them consumed two slices per day. It was also observed that none of the elderly participants consumed two or three or more slices of cheese per day. These results suggest that, in generally, participants include dairy products in their daily diet.

The results of the Chi square test revealed that in all cases were significant associations, and therefore Gender (χ^2= 29.423; p = 0.000; V=0.306, meaning a moderate association), Age group (χ^2= 37.194; p = 0.000; V=0.198, weak association) and Civil state (χ^2= 48.668; p = 0.000; V=0.227, weak association) influenced the daily habits of consumption of cheese.

Table 5 presents the types of cheeses with additional health benefits consumed by the participants in this survey. Most of the participants, 65.2%, answered that they didn't consume any cheeses with additional health benefits, followed by the participants who consumed light cheeses (31.5%) and in third place came those who consumed chesses enriched with calcium (12.1%). These trends were very different between women and men, being that 52.4% of the women consumed light cheese against only 3.5% of the men. As for men, most of them indicated that they didn't consume any cheese with additional health benefits (93.6%). Usually women are more concerned about gain weight than men [51]. Therefore, lower fat cheeses allow those who want to eat cheese still remaining within theirs personal dietary goals [52].

Table 5. Types of cheeses with additional health benefits consumed by the participants.

Cheese	Global		Women		Men		Chi square test		Cramer's coefficient
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	χ^2	p	V
Lactose free	0.6	99.4	1.1	98.9	0.0	100.0	1.501	0.220	0.067
Enriched with calcium	12.1	87.9	19.0	81.0	2.8	97.2	19.992	0.000	0.246
Weight control (light)	31.5	68.5	52.4	47.6	3.5	96.5	89.230	0.000	0.520
None	65.2	34.8	43.9	56.1	93.6	6.4	87.862	0.000	0.516

As for the association between the variables Types of cheeses with health benefits *versus* Gender, it was observed that there were significant associations between these two variables for three types of cheeses: cheese enriched with calcium (χ^2= 19.992; p = 0.000; V=0.246, weak association), light cheese (χ^2= 89.230; p = 0.000; V=0.520, strong association) and none (χ^2= 87.862; p = 0.000; V=0.516, strong association). Therefore, gender influenced the consumption of cheeses with additional health benefits.

3.3. Acceptance of the new product

Berries represent a variety of small fruits characterized by the red, purple, and blue colour. The most common berries are: blueberry, bilberry, cranberry, blackberry, raspberry, black, white or red currant, and strawberry [53]. In recent years, the attention given to berries has increased due to their important role in the modulation of oxidative stress, vascular function, inflammation, and lipid metabolism [16,54–56].

From the participants in the survey, 73.1% replied that they were aware about the benefits associated with the consumption of berries, being this percentage higher for women (83.2%) when compared to men (59.4%). The results of the Chi square test for the association of the variables Knowledge about berries benefits *versus* Gender showed significant differences (χ^2= 23.542; p = 0.000), meaning that gender influenced knowledge about berries benefits for human health, The value of Cramer's coefficient (V = 0.265) indicated that the association was moderate.

It was also analysed the association between the knowledge about health benefits of berries and education level. The difference between these two variables was found significant (χ^2= 38.291; p = 0.000), indicating that also education level influenced the knowledge about berries benefits for health and the participants with university degree were significantly more aware of these benefits than those who had secondary school. Again the association was moderate (V=0.339).

Other possible associations were investigated, namely the influence of the variables Age group and Profession on the knowledge about health benefits of berries. The results revealed that in both cases were found significant associations (Age group: χ^2= 55.568; p = 0.000 and for Profession: χ^2= 62.274; p = 0.000). Average adults and senior adults were more aware about the health benefits of berries, as well as employed and unemployed participants. The retired participants were the ones who showed a lower knowledge about the health benefits of berries. As for the Cramer´s coefficient, it was found a moderate to strong association for both variables (V=0.408 for Age group and V=0.432 for Profession).

According to the evidences, normally women tend to have greater levels of nutrition knowledge than men. Higher levels of nutrition knowledge are also associated with higher education level or socio-economic status [31,57–59] and tend to be equally higher among middle-aged persons than among younger or older ones [59–61].

Figure 4 shows the intention of consuming this new product, a fresh cheese with berries, and 73.1% answered that they would consume it. When seen by gender, the results were different, with men manifesting more interest in consuming this product (88.0%) than women (61.9%). These differences between genders were statistically different (χ^2= 30.019; p = 0.000), therefore gender

influenced if the participants might be potential consumers of this product or not. The association was found moderate (V=0.301).

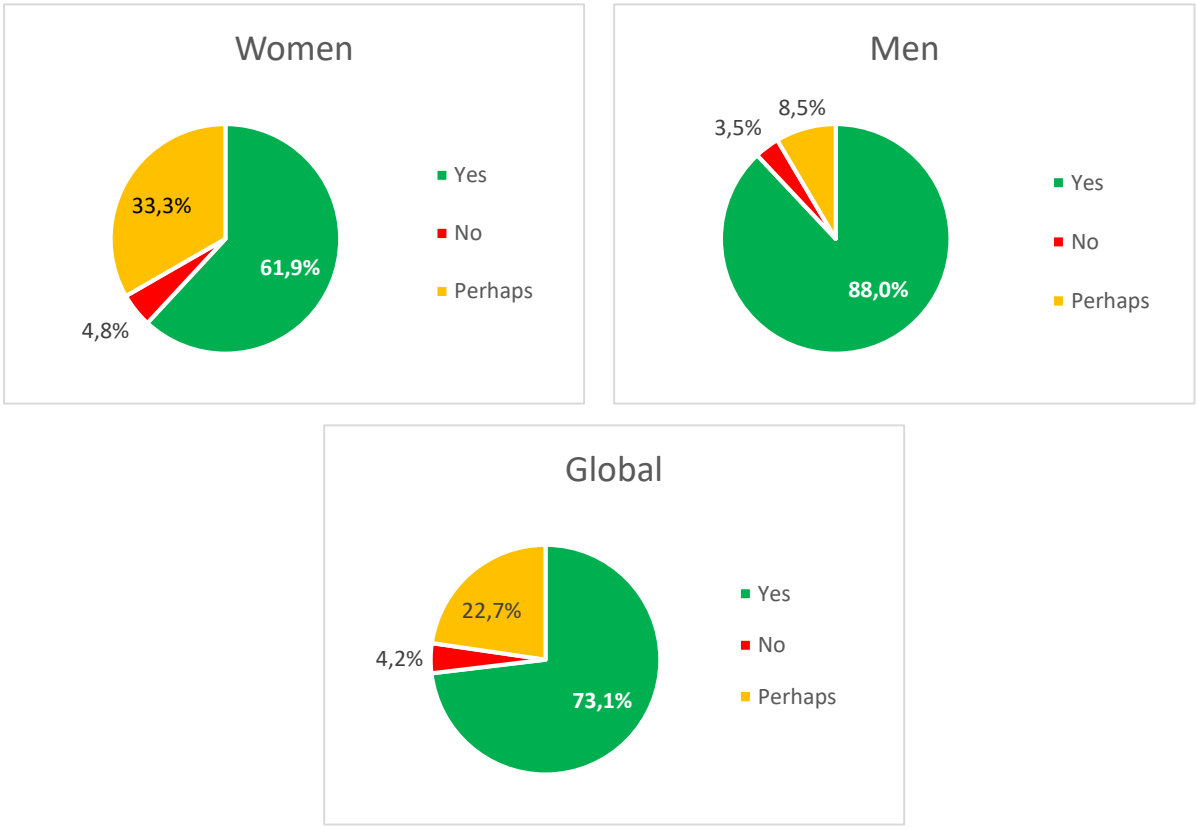

Figure 4. Intention of consuming a cheese with berries.

As for Age group, it was also found an association between that variable and the Intention of consuming (χ^2= 22.105; p = 0.001), being the young adults and the elderlies those who manifested a higher intention of consuming this product (82.9% and 85.7%, respectively), although, in this case the association between these variables was considered weak (V=0.183).

Figure 5 presents the attributes that the participants would like to find in a cheese with berries. In first place came the improvement of cardiovascular health, with 72.9% of positive answers and in second came high antioxidant capacity (51.4%). All the other attributes were not so valued by the possible consumers, with percentages under 50%.

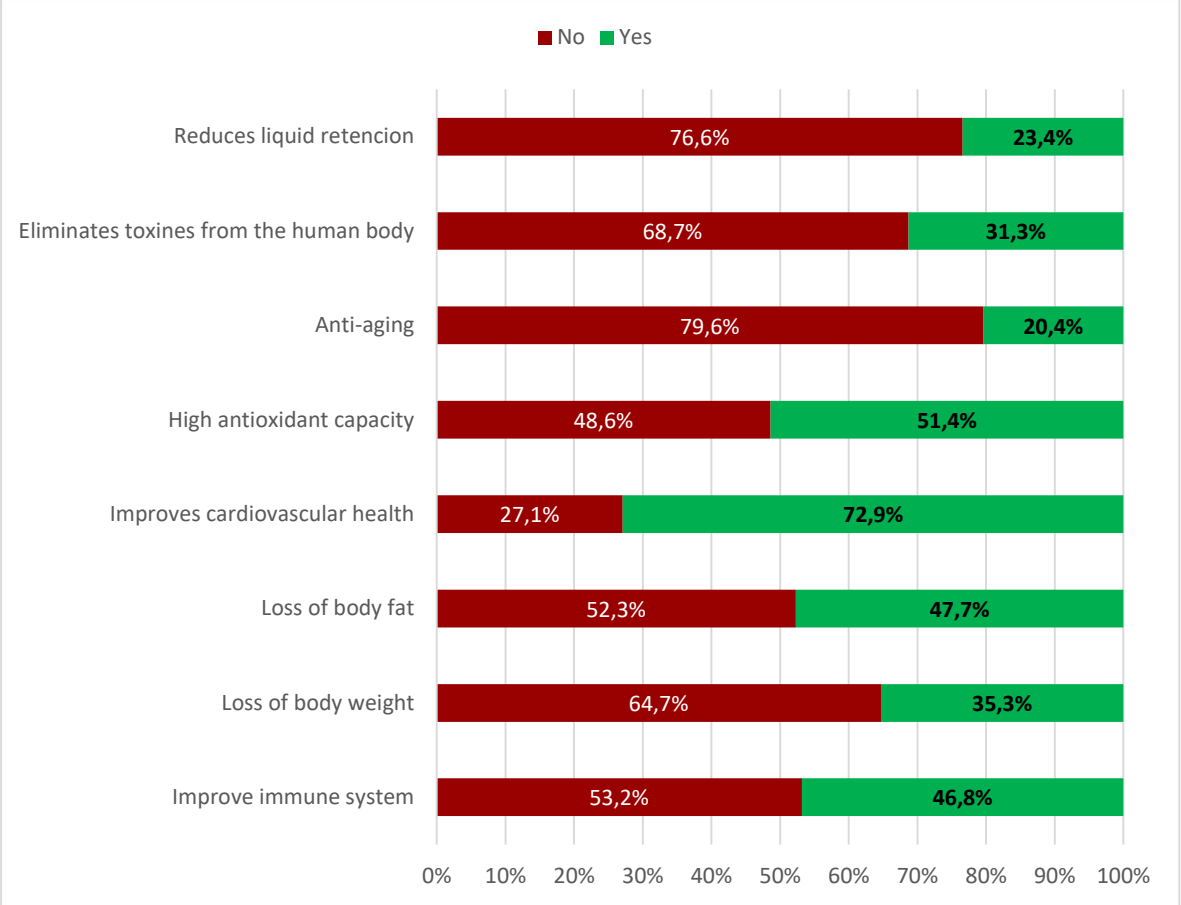

Figure 5. Attributes that the participants would like to find in a cheese with berries.

Table 6 shows some reasons that could lead the participants to consume this product. According to the results obtained, it was observed that the main reason presented by the participants for the consumption of this kind of cheese was the flavour (92.8%), being this percentage similar either for women and men (92.1% and 93.6%, respectively). Following in importance appeared the health benefits (68.1%). In this case, as it was expected, when women were compared to men, the results were quiet different, since 75.9% of women believed that the health benefits are an important reason to consume this product, against only 57.4% of the men.

Regarding the visual appearance and colour, women seem to be more concerned about these attributes than men. On the other hand, men (51.8%) demonstrated more preoccupation about the texture of the product when compared to women (35.6%).

Except for flavour, all the others reasons were influenced by gender, as it was shown by the results of the Chi square test. Nevertheless, in all cases the associations between the variables were weak.

Table 6. Reasons that could lead the participants to consume this product.

	Global		Women		Men		Chi square test		Cramer's coefficient
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	χ^2	p	V
Flavour	92.8	7.2	92.1	7.9	93.6	6.4	0.262	0.609	0.068
Visual appearance	14.2	85.8	19.4	80.6	7.1	92.9	10.065	0.002	0.174
Colour	2.7	97.3	4.7	95.3	0.0	100.0	6.829	0.009	0.143
Texture	42.5	57.5	35.6	64.4	51.8	48.2	8.682	0.003	0.162
Innovation	24.4	75.6	20.4	79.6	29.8	70.2	3.860	0.049	0.108
Health benefits	68.1	31.9	75.9	24.1	57.4	42.6	12.732	0.000	0.196

3.4. New ingredients for cheese

There are a wide variety of berries, therefore it was also investigated how the potential consumers faced the more common berries regarding their main health functionalities and their possible combinations with the product in question.

Table 7 refers to the importance of each suggested ingredient, considering their main health benefits. In general all ingredients were recognized as very important (score 5), with percentages of answers varying between 74.9% and 82.8%.

Table 7. Recognized importance of the suggested ingredients based on their main health benefits.

Ingredient	**Main functionalities**	**Score[1]** (% of answers)				
		1	**2**	**3**	**4**	**5**
Blackberry	Anti-aging	2.1	2.4	8.9	11.6	**74.9**
Cherry	Anti-inflammatory	1.2	1.2	6.7	8.3	**82.5**
Raspberry	Diuretic	3.7	0.9	9.3	9.0	**77.2**
Currant	Prevents diabetes	1.5	0.9	8.3	8.0	**81.2**
Blueberry	Reduces cholesterol levels	1.2	0.9	5.2	9.8	**82.8**
Strawberry	Helps alkalinizing blood	1.9	0.9	8.0	9.6	**79.6**

[1]scale: 1 = not important, 2 = of little importance, 3 = moderately important, 4 = important, 5 = very important

Figure 6 is relative to the participants' opinions about the possible combination of different ingredients with cheese. All ingredients had been identified as having the potential to combine well in cheese. Nevertheless, according to the participants' answers, the ingredients that could combine better with cheese were raspberry (92.3% positive answers) and blueberry (91.6%).

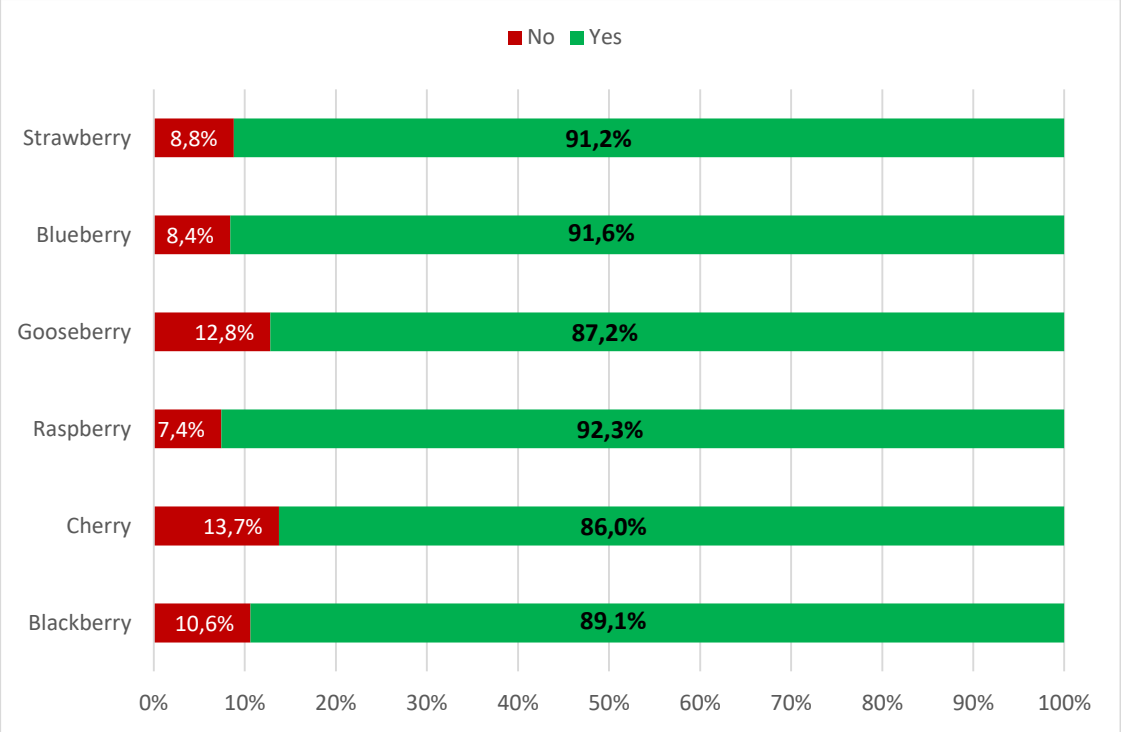

Figure 6. Opinions of the participants about the combination of different ingredients with cheese.

4. CONCLUSION

Among the most relevant results are the frequency of consumption of cheese, with most of the participants consuming cheese regularly. According to the preference for milk origin and type of cheese, the majority of the participants indicated to have preference for cheese made with sheep milk and for natural fresh cheese. As for the consumption of cheeses with additional health benefits, most of the participants indicated that they did not consume any cheese with these characteristics.

Regarding the intention of consuming a cheese with berries, the majority of the participants revealed that they might be potential consumers of this product, and particularly the men with higher levels of education. The participants indicated that they would like that this product would have the ability to improve cardiovascular health and have high antioxidant capacity.

Participants recognized as very important adding berries in cheese, because of their health effects and believe that all of the ingredients suggested might combine well with cheese. In this way, it would be possible to have a dairy product with improved health benefits, thus contributing for the expansion of the dairy industry and at the same time promoting better public health.

5. CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

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